

Vol. 1 No. 6
June 1986

\$1.50

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PACKET RADIO MAGAZINE

Dedicated to the Advancement of Packet Radio



**Steven
Roberts,
KA8OVA
in Aspen,
Colorado
on the
"Winebiko"**

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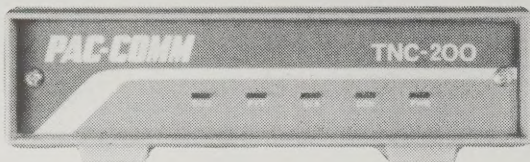
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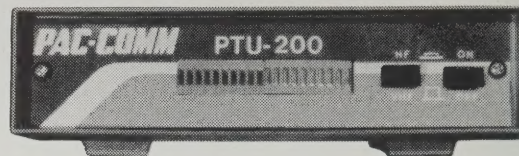
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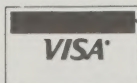
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PACKET RADIO MAGAZINE

PACKET RADIO MAGAZINE is published monthly by the Florida Amateur Digital Communications Association, Inc., 812 Childers Loop, Brandon, FL 33511. (813) 689-3355. Printed in USA.

Editor: Gwyn Reedy, W1BEL
Asst. Editor: Brad Voss, KE8CW

POSTMASTER: Forwarding and return postage guaranteed/address correction requested. Please send form 3579 to 812 Childers Loop, Brandon, FL 33511.

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Pacific Packet Radio Society
Rocky Mountain Packet Radio Association
Utah Packet Radio Association

Articles and photographs are solicited dealing with any aspect of digital communications. Both technical and operational topics are desired including new product announcements and equipment reviews.

News and Views

Gwyn Reedy, W1BEL

Florida now has two parallel networks on the populous SouthEast coast, as reported last month by Ted Huf, K4NTA. A GRAPES member called to ask what is going on with FADCA and whether the second frequency is a sign of splintering of FADCA. I was shocked at that interpretation, and consider what is going on now a sign of strength and vitality. The FADCA Packet Frequency Coordinating Committee and the FADCA Network Coordinating Committee are having regular meetings and the digipeater (read network node) operators are forming and implementing policies to get our network up to the loads it has to handle. I am very proud of those committees and their primary instigator, Tom Kneisel, K4GFG. They are grass roots organizations formed to face the problems of coordinating frequencies and network plans. Sometimes I am asked, "What does FADCA do besides publish a magazine?" The answer used to be (unfortunately), "Not much." For a long time FADCA was a one man show (one horse organization??) but as packet activity has mushroomed, a decentralization has had to take place. In step with that mushrooming growth has been a sharp increase in my personal work responsibilities, so that there has barely been time to get out the magazine, much less play an active leadership role in the organization. A few months from now should see a return to a more reasonable 50 or 60 hour workweek and I look forward to attending more hamfests, putting out a more timely magazine, and even getting on the air again. (If anyone thinks I am kidding about the workweek, they obviously have not tried to run a small business while working full time!)

Lyle Johnson, TAPR President, has been tabulating the results of the questionnaires sent out with the April Packet Status Register. With about 150 counted so far, the response is running about 2 to 1 in favor of combining PSR and PRM. Many of those against the merger do not know of PRM... I am really excited about this and hope that it comes to pass. With the combined efforts of all those that contribute to each publication, we can have a monthly magazine to be proud of.

This issue is the thinnest so far. Brad, the Asst. Editor, and I decided not to combine two monthly issues into one in order to get back on schedule. Rather we put this one out with what we had available and plan to get going on the July issue right away. You'll notice that many of the club pages are absent this issue... we can't print what doesn't get submitted.

73 until July. Gwyn.

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by Jim Grubbs, K9EI



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(see January '86 QST page 47 or February '86 CQ page 68)
and *Command Post* \$9.95.



P.O. Box 3042
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Cactus Corner

Lyle Johnson, WA7GXD

I hope last month's column was useful for those of you faced with deciding which TNC to buy, or what advice to give your friends who ask you which one to buy. If you still see ads in PRM this month, it means that either (a) the manufacturers hadn't read the column yet or (b) they were too late to pull their ads this month!

On a regional note, Arizona is now solidly on the packet map with WB7BNI up and running on Mount Mingus, able to see both the Las Vegas node and the Phoenix area. KV7B in Tucson is able to hit this path fairly regularly, but no one else in Tucson seems to be able to (it's a pretty long shot to Phoenix, about 120 miles and lots of high hills.) We are looking into a site for a digipeater/level 3 switch to link Tucson to Phoenix and the Great Beyond.

An NNC update was hinted at for this month, but I am going to keep you in suspense and postpone that report until next month.

A couple of news notes on the TNC marketplace.

The PK-232 version with the built-in modems is going to sell for \$319 (less whatever discounts you can wangle). And Kantronics has announced their KPC-2400, also for \$319, which includes a 2400 baud PSK modem in addition to their standard 300/1200 baud AFSK modems. Upgrades to KPC-1 and KPC-2 units are available for \$149. If you have a TNC 1 or TNC 2 and wish to experiment, Kantronics also has an adapter board for these units for \$149. You don't have to turn in your existing TNC.

Why 2400 baud? Is it twice as fast as 1200 baud? The answers may not be obvious, so please read on!

At first blush, running 2400 baud makes a lot of sense. It should be about twice as fast, allowing twice as many users on a given channel and generally aiding in relieving the congestion on packet during prime-time.

Let's take a closer look.

First, let's consider how fast 1200 baud really is on a typical packet channel. Make that a typical two-years-ago channel; we are going to assume light loading and close to zero retries for our first pass.

A typical keyboard message consists of about 80 characters. If no digipeaters are used, the packet overhead consists of two flags, a CRC, source and destination call signs (AX.25 Level 2 assumed), a control byte and, for the message packet, a PID byte. That makes a total of 100 bytes in the message packet and 19 bytes in the ACK.

Let's also assume that TNC default timings are used.

A timing diagram for this transaction would look like this:

DWAIT:TXD:PACKET: dead time :DWAIT:TXD:ACK

DWAIT	= 160 mSec
TXD	= 300 mSec
PACKET	= 670 mSec
dead time	= 200 - 500 mSec
DWAIT	= 160 mSec
TXD	= 300 mSec
ACK	= 130 mSec

TOTAL = 1920 - 2220 mSec, or about 2 seconds to get 80 characters of data through. This corresponds to about 40 chars/sec.

If we operate with the same radios, but at 2400 baud, we have the following situation:

DWAIT	= 160 mSec
TXD	= 300 mSec
PACKET	= 335 mSec
dead time	= 200 - 500 mSec
DWAIT	= 160 mSec
TXD	= 300 mSec
ACK	= 65 mSec

TOTAL = 1520 to 1820 mSec, or about 1 1/2 seconds to get 80 characters of data through. This corresponds to about 54 chars/sec. This is about 33% better.

Now, 33% is 33%. But it isn't 100%, which is what you might think if you didn't consider the channel and, more importantly, the radio characteristics.

Now, what would happen if we could get our hands on radios that turned around and stabilized in 10 mSec?

DWAIT would go down to around 20 mSec and TXD would drop to 60 mSec at 1200 baud and 35 mSec at 2400 baud. The throughput on our channel would become about 60 chars/sec at 1200 baud and about 100 chars/second at 2400 baud. This makes 2400 baud almost 50% better than 1200 baud, and makes 1200 baud 50% better than it now is.

If we could get the dead time out of the system, we get about 80 chars/sec at 1200 baud and around 130 chars/sec at 2400 baud.

The TXD factor doesn't drop to the radio spec because we have to allow for transitions to be received to synchronize the HDLC decoder on the receiving end. DWAIT is simply a factor that allows a digipeater to look at the channel and grab it long enough for another station to determine that the digi is transmitting.

The "dead time" may be due to many factors. In a TNC 2 or look-alike, the RESPTIME (protocol T3 timer) defaults to 500 mSec. But this time factor is also a fudge factor to compensate for the occasional retry, noise burst, or what-have-you that may (and will!) occur on a radio channel.

I think that the above, while simplified, indicates that we need to make real progress on digital radios. TAPR and others are looking at this problem now and trying to come up with fast, inexpensive RF hardware designed specifically for packet use.

At the TAPR annual meeting in 1985, Steve Goode demonstrated his 9600 baud modem with some modified radios. A TXD of 20 mSec was used, and I timed a long file dump. The throughput on the channel was over 7,700 bits per second, or over 950 chars/sec! Compared to our present "typical" 40 chars/sec, I think it is obvious that there is much to be gained AND WE HAVE THE TOOLS TO DO IT NOW!

One area that the new Kantronics modem may prove interesting in is satellite operation. OSCAR 10 has spectrum allocated that is used for packet, but it is used very little. Our present FSK modems just have a hard time cutting through the noise and spin modulation.

PSK can do much better. If the Kantronics modem design is close to optimum, it may be useful on this or similar channels. It would be nice if the modem could be used at slower speeds (400 bits per second has been demonstrated to work very well on OSCAR 10), but it appears that the Kantronics design is specifically designed for Bell 201 style operation. The noise margin for encoding with "dibits" used on Bell 201 is a lot less than straightforward PSK, so some testing and measuring will have to be done.

So much for 2400 baud PSK. TAPR's KPC-1 is on the upgrade list, so maybe I'll have some feedback in another month or two on actual performance with the KPC-2400 (assuming I can find another KPC-2400 to connect with!).

To conclude this month, I'd like to share some HF operating experience with you.

I modified my TNC 2 with the Amateur Packet Alaska modem adapter board. I also added an extra pole to the HF/VHF switch so when I change between 1000 Hz shift and 200 Hz shift the baud rate is also switched. Finally, I added a VN10 transistor to switch in the proper damping capacitor on the DCD lock detector circuit.

I plugged in a prototype TAPR tuning indicator and voila! I was on HF packet.

First off, I can report that the modem mods espoused by KV7B and N7CL make a difference! Tuning is far less critical when the changes are made.

Secondly, the tuning indicator makes tuning an HF packet signal a snap. One transmission is usually all it takes to get zeroed in.

So much for technical aspects. Operationally, I have noticed a few things that are a little disturbing.

So, I offer the following observations for your consideration.

It seems that many stations have a hard time tuning accurately. As a result they are reluctant to QSY. But, if you operate on 14.103/105/107 or 7.093/097, it is very important to QSY once a QSO is established. The BBS stations have a harder time tuning than the casual user, and they often operate on a sked. The QRM can be ferocious, so please QSY once you establish contact.

Operation on 14.103 can be especially dicey if your station is not tuned accurately. There are weak signal propagation beacons operating on 14.100 MHz and they CAN'T QSY. So, be sure that your "carrier" is at 14.103 or higher on 20 meters. Your transmitted spectrum will be concentrated around 14,101.3 kHz in this manner.

A couple of warnings are in order for operation on 14.103.

1) If for some reason you decide to operate with 600 Hz shift, don't operate on 14.103! Your bandwidth requirements go up considerably at this shift, and you are certain to bleed over onto the beacons.

2) If your TNC uses different (higher) modem tones than 1600/1800 Hz (like the AEA PK-64, which uses tones above 2 kHz), don't operate on 14.103! You will only give some poor beacon monitor sore ears and bad vibes about packet radio.

If you have a narrow IF filter (like 600 Hz or so), use it!

Most stations space themselves 2 kHz apart on HF. I suspect that it is because with much closer spacing their IF passes "adjacent channel" packets which may capture their AGC if they use a standard SSB IF filter.

With 200 Hz shift, the signal spectrum of interest is only about 500-600 Hz wide at 300 baud, so stations should easily be able to operate on 1 kHz, or even 800 Hz "channels" on HF.

If you have HF operating experience, I would appreciate it if you would write to me and share it.

Until next month, happy packeting!

M 26402 Lyle Johnson (WA7GXD,2973) 6/29/86 12:10 AM
KEYS:/NNC UPDATE FOR JUNE 28/ALPHA UNITS SHIPPING!//

To: Interested Packeteers
Fm: TAPR
Re: NNC Update for June 28, 1986

The first Alpha development NNC was delivered to KE7CZ on Thursday, June 26. Units will be forwarded to N2WX, KA2BQE, N4CI, N8BJX, KE4ZV, WB8OUE and WA1LRL on Tuesday, 1 July. Units will be shipped to KA9Q and WB4JFI upon receipt of the signed participation form.

Norm Sternberg, W2JUP, has volunteered to act as a general software development coordinator.

Continued on page 4.

TWO INTERNATIONAL DEVELOPMENT AND RELIEF ORGANIZATIONS, VITA (VOLUNTEERS IN TECHNICAL ASSISTANCE) AND CARE (NEW YORK, NY) JOINED FORCES IN THE DEMONSTRATION, WHICH WAS THE FIRST OF ITS KIND IN A DEVELOPING COUNTRY. THE DEMONSTRATION SHOWED HOW INEXPENSIVE COMPUTERS AND DIGITAL CONVERSION EQUIPMENT, COSTING \$500-\$1000 PER STATION, CAN BE ADDED TO EXISTING SHORT-WAVE VOICE TRANSMITTERS AND RECEIVERS TO PRODUCE ERROR-FREE "HARD COPY" RECORDS OF MESSAGES SENT AND RECEIVED.

TWO-WAY RADIO IS USED IN MANY RELIEF AND DEVELOPMENT PROJECTS AROUND THE WORLD. BUT VOICE COMMUNICATION FROM OR BETWEEN RURAL AREAS IS FREQUENTLY NOT ADEQUATE BECAUSE OF THE NEED FOR FREQUENT REPEATS WHEN NAMES AND NUMBERS ARE BEING SENT AND RECEIVED. ERRORS ALSO OCCUR WHEN MESSAGES ARE SCRIBBLED DOWN OR RELAYED AMONG MANY INDIVIDUALS. SOMETIMES OPERATORS HAVE TO DEAL WITH MORE THAN ONE SPOKEN LANGUAGE, AND THE AVAILABILITY OF A PAPER COPY HELPS TO ELIMINATE CONFUSION. FOR EXAMPLE, IN ETHIOPIA THERE IS A CONSTANT NEED FOR ACCURACY IN REPORTING CURRENT LEVELS OF AS MANY AS FIFTEEN GRAIN COMMODITIES IN SEVERAL TIERS OF WAREHOUSING. IT IS EXTREMELY DIFFICULT TO DO THIS BY VOICE AND EVEN MORSE CODE AND RADIOTELETYPE ARE SUSCEPTIBLE TO ERRORS INDUCED BY INTERFERENCE OR ATMOSPHERIC DISTURBANCES. MODERN BUT LOW-COST ERROR-CORRECTING DIGITAL TECHNIQUES WHICH PROVIDE PAPER COPIES OF MESSAGE TRANSACTIONS MAY PROVIDE A SOLUTION TO THIS PROBLEM.

TWO VITA VOLUNTEERS, RICK WHITING AND PAT SNYDER, BOTH OF THE MINNEAPOLIS AREA, SPENT THREE WEEKS IN MAY IN ADDIS ABABA, CAPITAL OF ETHIOPIA, AND AT A RURAL CARE PROJECT IN DIRE DAWA, ABOUT 300 MILES TO THE NORTHEAST. UNDER THE AUSPICES OF THE ETHIOPIAN RELIEF AND REHABILITATION COMMISSION, WHICH OVERSEES

NNC continued from page 3.

The units shipped lack the modem board. A lot of eight (8) modem boards have been received and will be built up in the next two weeks. Assuming the layout is then proven, sufficient units will be ordered to ensure an adequate supply for Alpha and Beta NNC development phases.

The Alpha team will be deciding on software tools. The NNC acts as its own development system, running ZRDOS+, a CP/M 2.2 compatible operating system.

As you may recall, the TAPR NNC is designed to act as a multi-port network switch for the evolving Amateur packet system. It contains a CMOS HD64180 processor (a superset of the familiar Z80), two DMA channels, four (4) HDLC ports, two (2) parallel ports (one configured as a Centronics compatible printer driver), two (2) RS-232-C asynchronous serial ports, a SCSI bus and up to 1/2 megabyte of memory, up to 256k bytes of which may be battery backed. (Alpha units contain 96k bytes of RAM, 64k bytes of which are battery backed, and 32k bytes of EPROM). In addition, a DMAed floppy disk adaptor may optionally be installed on the NNC (Alpha sites have this adaptor).

The Revolution continues!

ALL RELIEF AND DEVELOPMENT WORK, WHITING AND SNYDER TESTED EQUIPMENT ORIGINALLY DESIGNED BY AND FOR RADIO "HAMS," MANY OF WHOM HAVE EXPERIMENTED EXTENSIVELY WITH APPLICATIONS OF COMPUTERS TO COMMUNICATIONS SYSTEMS. BOTH WHITING AND SNYDER HAVE BEEN RADIO HAMS FOR MANY YEARS AND HAVE PLAYED MAJOR ROLES IN DEVELOPING THE TECHNOLOGY FOR AMATEUR RADIO USE, EMPHASIZING RELIABILITY AND EASE OF OPERATION. LIKE MANY VITA VOLUNTEERS, BOTH WHITING AND SNYDER HAD HAD PREVIOUS EXPERIENCE WORKING AND LIVING IN DEVELOPING COUNTRIES. WHITING IS EMPLOYED BY THE HONEYWELL CORPORATION IN MINNEAPOLIS WHICH ALSO SUPPORTED THE PROJECT WITH A GRANT TO VITA THROUGH ITS COMPANY FOUNDATION. ADDITIONAL SUPPORT CAME FROM THE UNITED CHURCH BOARD FOR WORLD MINISTRIES WHICH IS INTERESTED IN IMPROVING COMMUNICATIONS FOR OVERSEAS PROJECTS.

IN ADDITION TO LOCAL AND NEW YORK-BASED CARE STAFF, MANY OTHER INDIVIDUALS WERE ALSO INVOLVED IN THE SUCCESSFUL EFFORT. ACCORDING TO DR. GARY GARRIOTT, VITA'S MANAGER OF INFORMATION TECHNOLOGY WHO CONCEIVED THE IDEA LAST YEAR AFTER A VISIT TO ETHIOPIA WITH CHARLES ZUMBRO OF CARE'S NEW YORK OFFICE, MODERN "ELECTRONIC MAIL" SYSTEMS PLAYED A KEY ROLE IN RECRUITING WHITING AND SNYDER AS WELL AS OTHER PARTICIPANTS. DON MERTEN, FOR EXAMPLE, A CONSULTANT TO THE PROJECT, PREVIOUSLY WORKED ON RADIO COMMUNICATIONS SYSTEMS IN ETHIOPIA AND DAVID PEDERSEN, AN ENGINEER FOR A COMPANY IN UTAH, BUILT SOME OF THE EQUIPMENT THAT WAS DEMONSTRATED. ALL ARE RADIO HAMS.

WHEN TECHNICAL DIFFICULTIES HAMPERED PROGRESS, AN INTERNATIONAL TELECONFERENCE ALLOWED THE VOLUNTEERS IN ETHIOPIA AND EXPERTS BACK IN THE UNITED STATES TO DISCUSS THE PROBLEMS. LOU APPEL, OF DAROME, INC., DONATED THE SERVICES OF HIS COMPANY TO ESTABLISH THE TELECONFERENCE LINKS.

"THE FASCINATING THING ABOUT THIS PROJECT," SAID GARRIOTT, ALSO A RADIO HAM, "IS THAT EVERYBODY MADE A CONTRIBUTION TOWARD A COMMON GOAL THAT WOULD HAVE COST TENS OF THOUSANDS OF DOLLARS IF DONE COMMERCIALY. THE RESULTS ARE SIGNIFICANT--THEY SUGGEST AN OPTION FOR SOLUTIONS TO THE COMMUNICATIONS PROBLEMS THAT HAVE LONG PLAGUED DEVELOPMENT PROJECTS EVERYWHERE." HE ADDED "THAT VITA IS ALREADY RECEIVING INQUIRIES FROM PROJECTS IN OTHER COUNTRIES ABOUT THE DEMONSTRATION."

ANYONE WILLING TO SHARE HIS OR HER SKILLS CAN BECOME A VITA VOLUNTEER. FOR MORE INFORMATION, WRITE: VITA, 1815 N LYNN ST, SUITE 200, ARLINGTON, VA 22209

- PRM -

Fm: Frank Emens W4HFU

We now have the 450 link between Huntsville and Birmingham with dual port TNCs working at both ends. It is still at 1200 baud, but we have a modem whiz working on the 9600 baud problem. What helped our cause greatly was getting a grant of some 50 or 60 UHF radios from a local company. They've sparked a real 450 upheaval in Alabama.

- PRM -

Computing Across America with the Winnebiko

Brad Voss, KE8CW

We have all seen or heard by now various forms of mobile packet radio. There is, of course, the packet stashed in the briefcase trick, packet in the car, packet in an airplane, packet on a steam powered passenger train (watch for the cinders), and we will hopefully see packet on a space shuttle in the near future. How about packet on a bicycle while traveling 20,000 miles across the U.S. and Canada?

Steve Roberts is a freelance writer who decided to abandon the comforts of his home and office to live the life a wandering nomad on a bicycle. Since Steven is not a wealthy man he has to continue writing and selling his manuscripts to finance his living expenses. Steven designed a bicycle that would allow him to carry the tools of his trade, primarily a Hewlett Packard Portable computer with outboard disk drive.

The bike is affectionately called the "Wonderous Winnebiko", and has already logged more than 10,000 miles. Since the first 10,000 miles the Winnebiko has undergone some major technical redesign. The original 5 watt solar panel has been replaced with a pair of 10 watt Solarex units, and there is now a completely new electrical system. The most visible of the new components is what Steven calls the ICEbox, for Information-Communication-Entertainment.

The ICEbox which rests on a shock-isolated shelf roughly parallel to the plane of the old solar panel, is the control center of the bike. It contains three microprocessors, and it has a hinged front panel consisting of 5 liquid crystal displays. It is waterproof, and it folds up to expose the Yaesu 290, CB, shortwave receiver, cassette deck, broadcast FM, touch-tone pad, diagnostic panel, and a TNC-200 for packet radio.

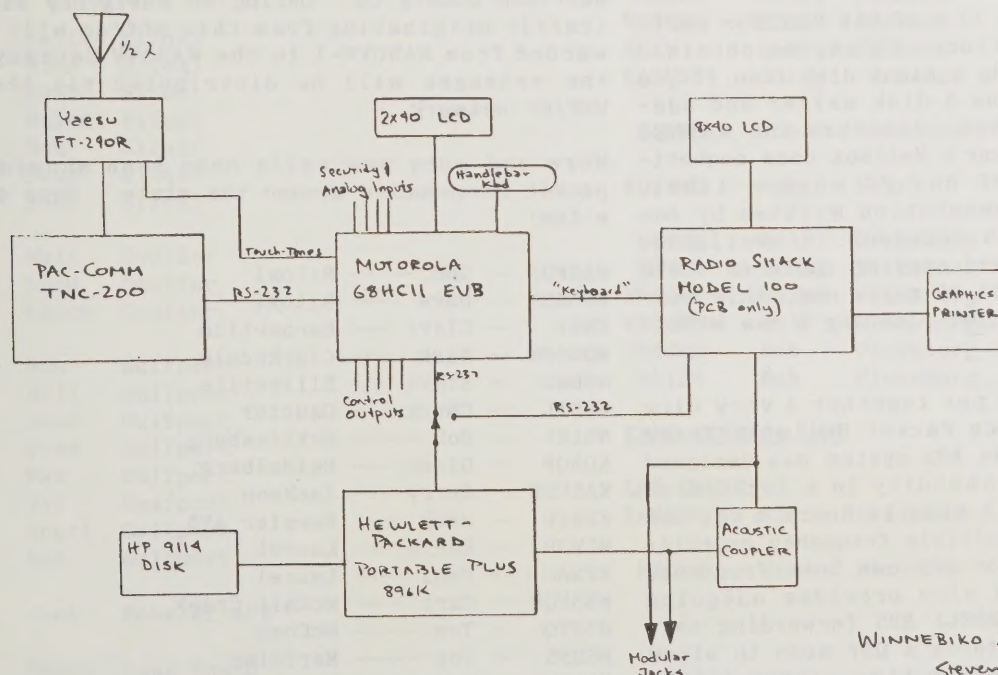
The processors all interact as shown in Figure 1. The central controller is a 68HC11 board, which handles security, RS-232 data routing, handlebar keyboard conversion, and analog data acquisition (for the software battery fuel gauge, electronic compass, and so on). Text-processing and on-the-road file management are handled by an 80C85 board (the guts of a Model 100), which not only displays its activity on a 2x8 inch LCD but also talks to a tiny printer.

Packet communications are handled by the TNC-200 CMOS board which is connected to the Yaesu 290 and the optional 35 watt amplifier. The packet setup will share the spotlight with a traditional telephone modem as a communication link with the rest of the world. Steven anticipates considerable media interest in this mass of technology that enables him to maintain a stable social life while living on a bicycle. This is sure to spawn interesting stories, especially when Packsat goes online.

In between the daily grind of peddling the bike and writing articles for a cast of publications, Steven finds himself online on electronic mail networks. His network address and methods to read his progress and leave mail for him will be published in a future issue.

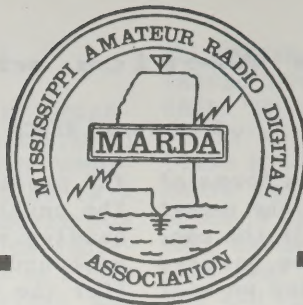
Steven will be departing from EXPO in Vancouver in early September, accompanied by a companion on a similar vehicle. PRM will publish releases of Steven's progress as they are made available. In the meantime, watch for KA8OVA/Winnebiko-mobile on packet.

- PRM -



MARDA

The Official Newsletter of the



MONITOR

Mississippi Amateur Radio Digital Assn

Patrick J. Fagan - WA5DVV
President - MARDA

LOUISIANA ORGANIZES:

Some very exciting news has transpired recently and it involves one of our PACKET neighbors. On June 22, the Louisiana Amateur Packet Radio Society (LAPRS) was formed at a meeting in New Orleans. Packeteers in attendance agreed that a STATE-WIDE unified effort was needed to ensure growth of the NETWORK throughout Louisiana. An election was held and the following officers were named:

Emile Alline NE5S --- President
Jack Coffee WD5ELJ -- Secretary

Announcements have been sent to Arkansas, Texas and Mississippi so that interfacing can get underway. Application for a Charter and affiliation with the ARRL are also in the works. You may contact LAPRS for a membership form and more information at the address below:

LAPRS Secretary
10026 Hackberry
Baton Rouge, LA 70809

The MARDA group welcomes LAPRS and wishes them the best of luck in their future packet endeavors.

BBS UPDATE:

Hank, WORLI says version 11.6 of his MailBox software is now in distribution. It may be obtained from Wes, K7PYK, by sending a blank disk (two if you want the source code) plus a disk mailer and adequate return postage. Wes, also has the WA7MBL Turbo Pascal version of Hank's MailBox code converted to run on the IBM PC and PC work-a-likes. Additionally, SYSOP documentation written by Jon Pearce, WB2MNF, for both versions is available. Contact Wes for mailing and copying costs on these documents. Totalling almost 80 pages now, this manual is must reading for anyone planning a new WORLI-type BBS system.

Bob Bruninga, WB4APR has put together a very nice Dual-Port Multiple Frequency Packet Bulletin Board program for the C-64. This BBS system was designed to serve a limited user community in a local area network. It will run full time 24 hours a day and is frequency agile. This multiple frequency capability allows for operation on its own home frequency to serve local users and also provides outgoing connectivity to regional WORLI BBS forwarding networks. Bob's software features a QSY mode to allow a frequency change for a given time window (after midnight). As many as four alternate frequencies

can be monitored by one radio/TNC combo. A custom user transceiver interface is required, however. All messages are stored in RAM with an automatic save-to-tape backup once a day. A manual save TO and load FROM disk has been provided as a convenience. Full WORLI auto-forwarding protocol has been implemented. A copy can be obtained from Bob on cassette for \$5.00 to cover handling. Disk copies will be provided if you furnish a formatted diskette.

HERE, THERE & EVERYWHERE:

Hank, WORLI is moving to California. His 20 meter signal will be missed at this QTH. Look for activity from the west coast as soon as he gets a wire up. I sure hope we can find an HF GateWay to take up the slack when he finally QRTs in Massachusetts. The traffic MUST go through.

Steve, N5DWU is Ellisville (near Laurel) has a WB4APR BBS system on-line now. His BBS forwards to the Gulf Coast and the path is solid 90 % of the time.

Harrison County Civil Defense in Gulfport was recently introduced to lightning. Eleven radios and attached antennas were affected. The PACKET system was back up in short time. Just a blown fuse in the power supply. Carlos, KA5CYR, says most of the other gear has returned to service or will be operating very soon.

The WB4APR BBS software is being installed at the Harrison County CD. During an emergency situation, traffic originating from this office will be forwarded from KA5CYR-1 to the WA5DVV GateWay. Then the messages will be distributed via the MARDA VHF/HF network.

More and more new calls have been showing up on packet frequencies around the state. Here are just a few:

WA5FDP	--	Don	-----	Biloxi
WB5KDV	--	Dave	----	Biloxi
KX5I	--	Cliff	---	Burnsville
WD5DHW	--	Mark	---	Clarksdale
N5DWU	--	Steve	---	Ellisville
KE5TL	--	Chuck	---	Gautier
N5IEL	--	Bob	-----	Hattiesburg
KD5QP	--	Glenn	---	Heidelberg
KA5USH	--	Jerry	---	Jackson
KB4IU	--	Jack	----	Keesler AFB
W5VJR	--	Earle	---	Laurel
KF5AU	--	Paul	----	Laurel
WB5HQH	--	Gary	----	McCall Creek
N5HTQ	--	Tom	-----	McComb
W5DNS	--	Joe	-----	Meridian
N5AXV	--	Sam	-----	Natchez
N5ISE	--	Thomas	--	Picayune

KE5WO -- Harvey -- Port Gibson
 WB5MFK -- Ed ----- Tishomingo
 KA5GNM -- Bill ---- Tishomingo

440 MHZ BACKBONE:

Work has started on a Backbone Network in Mississippi. The MARDA-ON-THE-ROAD packet contingent recently traveled to Birmingham, Montgomery and Mobile to meet with members of ALA-NET. A decision was made to interface with Alabama's UHF Packet Network now well under construction. MARDA will initially link with ALA-NET at Mobile on 448.4 Mhz. A path to Gulfport will be attempted with an additional relay near Pascagoula if needed. Once completed, MARDA will look at another I/O near Meridian with a link to Tuscaloosa. Plot the progress here as we continue to improve the NET.

Until next month, may all your CONNECTS be many and RETRIES few.

- PRM -

MISSISSIPPI AMATEUR RADIO DIGITAL ASSOCIATION

<- This is the MARDA NETWORK as of July 1, 1986 ->

GULF COAST LAN

DIGIPEATER:

WA5DVV-2 [BIX] Biloxi MADA (145.01 Mhz)
 WA5DVV-3 [GPT] Gulfport MADA (145.09 Mhz)

PBBS:

WA5DVV Gulfport PBBS/HF GateWay
 (14.107 Mhz / 145.09 Mhz)
 WA5DVV-1 Gulfport PBBS/VHF GateWay
 (145.01 Mhz / 145.09 Mhz)

LAN USERS:

WA5MPH Butch Bay St. Louis (Diamondhead)
 K5GY Terry Bay St. Louis

W5IBO Fabian Biloxi
 W5QDN Mike Biloxi
 K4HKD Ross Biloxi
 K4JHE Wayne Biloxi
 WA5FDP Don Biloxi
 WB5KDV Dave Biloxi
 KB5FC Jack Biloxi

WA5MPI Walt Gautier
 KE5SJ Fred Gautier
 KE5TL Chuck Gautier

WA4TWE Bob Gulfport
 KA4CRT Bill Gulfport
 W5PDG John Gulfport
 K5QBU Fred Gulfport
 WA5DVV-5 Pat Gulfport
 WA5SUE Vic Gulfport
 KA5HOP Scott Gulfport
 WB8BIE Bob Gulfport

KB4IU Jack Keesler AFB

N5HGU Henry Long Beach

N5ISE Thomas Picayune
 W5BDS Jerry Vancleave

SOUTHEAST LAN

DIGIPEATER:

W5CJR-1 (HBG) Hattiesburg HARC (145.01 Mhz)

PBBS:

N5DWU Steve Ellisville SMRA (145.01 Mhz)

LAN USERS:

N5DWU Steve Ellisville
 N5IEL Bob Hattiesburg
 W5VJR Earle Laurel
 KF5AU Paul Laurel

SOUTHWEST LAN

LAN USERS:

WB5HQB Gary McCall Creek
 N5HTQ Tom McComb
 N5AXV Sam Natchez
 KE5WO Harvey Port Gibson

WEST CENTRAL LAN

DIGIPEATER:

WB5SXX-1 (VKS) Vicksburg VARC (145.01 Mhz)

PBBS:

WD5IKD Pearl BBS (145.01 Mhz)
 WB5SXX Vicksburg BBS (145.01 Mhz)

LAN USERS:

N5III Steve Brandon
 W5MUG Floyd Jackson
 WB5EWM Bill Jackson
 NC5Y George Jackson
 KA5USH Jerry Jackson
 K5HYE John Mendenhall
 WD5IKD Alan Pearl
 W4MKS Bill Vicksburg
 K5VXV Brent Vicksburg
 WB5OWY Ralph Vicksburg
 WB5SXX Bill Vicksburg
 WB5YKR Bob Vicksburg
 N5IDW Bob Vicksburg

EAST CENTRAL LAN

LAN USERS:

KA5QDP Glenn Heidelberg
 W5DNS Joe Meridian

Continued on page 9.

FADCA > BEACON

THE FLORIDA AMATEUR DIGITAL COMMUNICATIONS ASSOCIATION

Bytes from the Write-Only Memory

Ted Huf, K4NTA

This is my first month as editor of the FADCA>BEACON page of the PRM. I am happy to help Gwyn out by doing this, but I can not do it by myself. I will be pinging some of you around the state via the BBS for news of your area. Even if I don't ask you, please send me a message telling me what is going on in your area. A very special thanks goes out to those who sent me news items with such short notice this month.

Have you looking around at what you can get a personal computer for lately? IBM has dropped their prices for a basic model with 256K, two floppy disk drives, mono monitor and adapter to around \$2000. The real bargains are found through the mail order houses. I called one California after seeing their ad in PC WEEK to get a price quote. For a 4.77/8 Mhz XT clone system board with 640K installed, floppy controller, 180 watt power supply, AT style keyboard and case, the price was about \$350. You could add a couple of 360K drives for around \$75 each. A mono monitor and adapter would cost under \$200. So for something like \$700 you could have a complete PC. If 720K of floppy storage was not enough for you, you could add a 20 meg fixed disk with controller for around \$400. Now for the caveat. With these "kits" you get almost no documentation, so you better have a pretty good idea what you are doing or have a buddy around who can help out if you get in trouble. Oh, I asked the Chinese lady on the phone if the system board had a non-infringing BIOS. She only would say that it came from Taiwan!

Last month we talked about the 145.03 BBS network in Southeast Florida. This month I would like to report that it seems to be doing very well. There have been some troubles with a couple of the digis but all in all having the BBSs off of 145.01 is helping a lot. The 145.03 network runs from Stuart on the North to Miami on the South end. My BBS (K4NTA) operates dual port on 145.01 and 145.03 because it is at the end and must forward to other BBSs on 145.01. The digis on 145.03 are as follows:

Stuart	KA4LIF-1
West Palm Beach	WPB-0
Pompano	PMB-0
Ft Lauderdale	W4IET
Miami	KOKBY & K4TKU

KOKBY and K4TKU are also the BBSs in Miami.

I understand that there is an new digipeater in Perry, Florida. It's call is PRY and is said to be able to connect with Tallahassee. More on this later.

Jim, K4TKU, sent me this info on release 11.6 of the WORLI MailBox software. By the time this is published, we should be running that version here also.

1. Changes and additions since version 11.5 are:
Added FL (File Local users) and FB (File BBS).
Tag in config to enable/disable retention of "F" msgs on forward. Cleaned up the handling of tnc state changes with MailBox state changes.
2. Changes and additions since version 11.4 are:
Login procedure split from TNC.MAC into LOGIN.MAC
Logic changed to allow local users to connect if "only bbs" flag set. If station connecting is a bbs: bypass # digi check, exclude checks. New tag in config to exclude connects thru digi with illegal call. Changes from K1BC (Thank you Bob ...): LM now lists messages TO and FROM user.
3. Changes and additions since version 11.3 are:
Changes from K3RLI (Thank you Ed ...): Help and Info files may be \$sys. WN command for users. Message type "F" is never killed after forward, only marked. "Expert user" flag. No logoff message, short prompt.

- PRM -

Melbourne LAN News

Reported by Bill WB9IVR

Have you read a copy of the FCC Novice Enhancement Notice of Proposed Rule Making yet? It's been published in the major ham magazines now and the FCC is looking for comments on the proposal, known as PR 86-161.

Your comments (plus 11 copies if you want all the commissioners to get a copy, or plus 5 copies minimum) are due in by July 16, 1986. Dave Sumner, the ARRL general manager, points out in the July issue of QST that Novice Enhancement is no longer a question of if, but of when.

Field day will have come and gone by the time you read this. In Melbourne, the South Brevard Amateur Radio Club and Florida Institute of Technology Amateur Radio Society set up at FIT's Southgate Field, corner of Babcock and University in Melbourne. The Harris Corporation Amateur Radio Club was located at the Girl Scout area of Wickham Park in the Eau Gallie Section of Melbourne.

The Platinum Coast Amateur Radio Society was again set up in the disaster communications room at the Red Cross on Hickory Street.

It's fun to tell other hams about packet, but have you given any thought to attracting non-hams to Amateur Radio using packet? A little pizzazz and you

Atari 520ST

Chuck Harrington, WA4GPF

Is there an Atari computer in your future? You may be surprised to learn that Jack Tramiel, the man responsible for giving us the Commodore 64, has been at the head of The New Atari Corporation for the last two years. His latest offering, is known as the Atari 520 ST, or just ST.

This new computer has 512K RAM, with an operating system contained in 196K of ROM. It has a full complement of standard I/O ports; RS232, parallel printer port, hard disk port, video and rf modulator outputs, joystick and mouse ports, 196K cartridge port, and a 104 key keyboard. The state of the art, Motorola 68000 32/16 bit cpu, runs at a full 8 Mhz! Best of all, the 520 ST system sells for about the same price as a Commodore 128!

Software? There probably isn't much yet, right? Wrong, software for this system is coming very fast. Developers realize they have a chance to get in on the ground floor of another C64 like bonanza; there is an extensive assortment of titles available right now. In fact, by the time you read this, the FADCA software library may have its first piece of ST software; I have developed PACK-ET-TERM 3.0 for the ST. This software has a combination of features that I believe is not available in any other packet terminal program for any other computer; and it is free! The program will be copyrighted, because it is of commercial quality; but it will never be sold. It has been developed to introduce the packet community to the enormous potential of these new ST computers; in coming issues of PRM, we will explore this potential together.

- PRM -

Melbourne LAN News continued from page 8.

can be helping to introduce people to the finest hobby there is. All you have to do is tell people about it! Possible groups to target are computer clubs who currently have to rely on ye olde telephone company for interconnection, junior and senior high schools - again stressing the computer tie in.

Once they find out they can TALK too, you'll have 'em sold. Efforts need to be backed up by a upcoming novice class to help out the folks, but that's not hard at all. And in about 10-12 weeks you'll have another batch of new operators and you'll have entered the ranks of the "Elmer".

The Melbourne Hamfest will be the weekend of September 6/7 and will again be held at the Melbourne Auditorium. Exams will be held both days and several seminars will be held including packet radio. The Melbourne Ramada Inn is the "official" hotel and has special rates for hamfests - be sure to mention you are coming for the hamfest when making your reservation.

Exam information is available from The South Brevard Amateur Radio Club for an SASE sent to:

South Brevard Amateur Radio Club
Amateur Examinations
P. O. Box 2205
Melbourne FL 32902-2205.

Exams conducted under the ARRL/VEC system, see page 76 in the July 1986 QST for more information. Advance registration is recommended to guarantee your seat at the exam. All classes of license (Novice to Extra) will be given. Exams will be given on Sunday.

Information on the hamfest proper will be mailed out by the hamfest organizers.

- PRM -

MARDA NETWORK continued from page 7.

NORTHEAST LAN

DIGIPEATER:

KC5RY-1 (UBS) Columbus AFB (145.01 Mhz)

LAN USERS:

KX5I Cliff Burnsville
KC5RY Jorge Columbus AFB
NJ5E Ramsey Starkville
WB5MFK Ed Tishomingo
KA5GNM Bill Tishomingo
K5EFA Royce West Point

NORTHWEST LAN

LAN USERS:

WD5DHW Mark Clarksdale

NORTH LAN

LAN USERS:

WD5EED Jim Hernando (Station is active with TMMnet, a network of stations along the Mississippi River - MS/AR/TN/MO)
KD5HC Benjie University (U of Mississippi)

The network suffers from a serious lack of activity in the Northern part of the state. More and more stations are coming up weekly so the network should grow at quite a rapid pace in the next few months. If you know of additional areas within the state where packet stations are operating please forward this info to:

Patrick J. "Pat" Fagan WA5DVV
2412 E. Birch Drive
Gulfport, MS 39503

(601) 832-8859

WA5DVV @ WORLI
WA5DVV @ W9CD

Compuserve ID:
74246,1310

- PRM -

Eliminating POOP from Packet

Peter Eaton, WB9FLW, and Lyle Johnson, WA7GXD

[The following article is printed at the request of a number of FADCA members. It was informally presented at the 5th ARRL Computer Networking Conference in Orlando, but was not published in the proceedings. It has been published in the TAPR Packet Status Register and several packet newsletters, and has appeared on numerous electronic media. The article is not gospel but should serve to stimulate people's thinking about courtesy on a shared channel. It is a lot like driving on the highway... Some people are oblivious, some are discourteous, and while many are courteous, but their definition of courtesy varies (like the person at a 4-way stop intersection that fouls up the flow by waving through someone out of turn.) ed.]

Overview

A lot of POOP has been discovered on packet frequencies across the nation and around the world! Indeed, in addition to its health and welfare implications, POOP is both unnecessary and of ten times offensive.

While other four-letter acronyms have been used to describe the characteristics of POOP, it is hoped that POOP is sufficiently recognizable by packeteers to eliminate the need to express the others! What, exactly, is POOP? How does one eliminate it? How can one help others to cause it to not be propagated? The answers to these questions form the basis of this paper.

POOP - What is it?

POOP is simply an acronym for Poor Operating On Packet. While it may evoke other thoughts in one's mind, the relationship between those other thoughts and poor operating practices is probably pretty clear and will not be further elaborated upon.

POOP - How does one eliminate it?

In order to eliminate POOP, one must simply not generate it. If it is generated, it will be passed onto packet channels, needlessly clogging them.

While there are many varieties of POOP, and it would be impossible to describe them all in this paper, several of the more obnoxious and prevalent forms of it are described.

Frog POOP

If you have ever been around a pond, you have undoubtedly heard the loud and constant noise put on by frogs. It seems amazing that so small a creature can make such a disturbance!

If you have ever monitored a busy packet channel, you have probably seen plenty of beacon messages. Here again, a large disturbance may be caused

Beacon features were included in TNC software in the early days of packet when stations were few and far between. Like the frog on the pond, the noises were made to attract attention of like species -- in this case, other packet stations. Unlike the frog, who settles down after he gets what he was looking for, many packeteers continue to send beacons, often on crowded channels.

Some packeteers contrive clever beacons, to sound bells, clear screens, or print multi-line declarations on the screens of all who can decode the beacon.

The proper rules governing beacons are simple:

- 1) Determine why you need to beacon.

Beacons declaring that you are unavailable, or on vacation, are perfectly useless and mark you as a real POOPer. If the information you are attempting to convey is important, perhaps leaving it as a message addressed to all on the nearest packet bulletin board station (PBBS) is a better alternative.

On the other hand, if you are living in tornado alley and see a funnel, an urgent beacon may be appropriate.

(In-search-of POOP)

If the purpose of your beacon is to let folks know you are around and want to connect, it may be better to just turn on the radio and let your TNC decode a few packets from other stations. This way you can see who is on and then simply send a connect request rather than a beacon.

Many new TNC software releases include an MHEARD function, allowing you to see the contents of a buffer containing the last several packet stations heard by your station.

If you are convinced that you must transmit without listening for a few minutes (or if the channel really does appear dead), dropping into UNPROTO mode (CONVERSE mode from COMMAND mode without first connecting) and typing a short CQ message (which may be as simple as a carriage return if UNPROTO is set to CQ) is preferable to beaconing one.

- 2) Compose the briefest possible beacon text.

Cute beacons that fill a screen, sound bells, or clear screens will only mark your station as obnoxious. It is a classic way to lose friends and increase your count of enemies!

- 3) Use the BEACON AFTER mode rather than BEACON EVERY.

If the channel is busy, one-way broadcasts (which is, after all, what a beacon really is) are not welcome. It's bad enough to try and maintain a connection through a digipeater or two without

having having a channel clogged by transmissions from unattended stations that come on the air every few minutes. Beacon AFTER with a value of thirty minutes will assure that you do not add to busy channel bedlam.

4) Don't send beacons more often than every thirty minutes, preferably less frequently. (TNC 1 and TNC 2 users, B A 180 is the recommended setting.)

5) Digipeat beacons with care!

Digipeating may cause a large number of local packeteers to be subjected to screens full of your beacon text. This may be desirable. Then again, it may not. Consider your motive and objective for your particular beacon, then set up the path.

Squid POOP

As Amateurs, we admit to occasional spelling errors. We meant Scwid (Sending CWID)... Sending a CWID is somewhat akin to using class B (spark) transmissions on the lower end of 20 meters when the band is open. It's annoying and serves no useful function.

The CWID feature was included in earlier TNCs to help the uninitiated masses of Amateurs identify a station that was making "packet racket." The decoder of the CW would (hopefully) contact the station sending the CWID and inform him of the strange noises emanating from his radio, upon which the proud packeteer would politely inform the bearer of the bad tidings that the noise was intentional. In the ensuing conversation and demonstration, another convert would then be won over to the new way of communicating.

Besides, the FCC once required a CWID every ten minutes or so!

Nowadays, the FCC has recognized our heretical behavior, packet is state-sponsored and CWID is no longer required of packet stations.

As a final note, most packet operation occurs on VHF, and everybody knows that most folks on VHF can't copy code anyway!

Bull POOP

Try entering a field containing a bull. While many bulls are mild mannered, some are very territorial and will chase you away.

The same is true of a packet BULLETin board station. Many are mild mannered, aware of other packet stations on the channel and content to share the channel with them.

Others, however, are not. They will chase you away unless you came to feed them. They do it quite simply, and often are ignorant of their ferocity. A skilled matador, however, can soon tame a ferocious bull. So can the operator of a PBBS tame his BULL.

The keys are TNC setup files. Most PBBS software contains a file (or files) describing the characteristics of the TNC(s) attached to the computer serial port(s). The magic commands are PACLEN, MAXFRAME and DWAIT.

If a PBBS is operating on HF, PACLEN should be fairly short, perhaps 40 or so. Since this parameter describes the length of the information field, not the header and control bytes, a setting in excess of 80 (the length of one line on most computer displays) is probably the longest needed.

MAXFRAME can be the cause of a lot of useful bandwidth reduction. If the PBBS is on a channel shared by other users, MAXFRAME 1 is reasonable. We have heard PBBS's sending packets of many frames to stations that were having a hard time decoding anything, and the channel was reduced to uselessness for other stations. Similarly, we have often heard PBBS's on HF sending long packets of multiple long frames, getting an ACK on the first one only (if any), and repeating the process over and over. Computers are infinitely patient, but humans wanting to use the channel may not be!

DWAIT is perhaps the strongest medicine to apply to an overly possessive BULL. PBBS stations should set DWAIT to 320 milliseconds. For a TAPR TNC 1 running 3.X software, this corresponds to DWAIT 8; for a TNC 2 it is DWAIT 32. If you are not the owner of a BULL, but venture into territory where one lives, you can help tame the beast! The following suggestions are highly recommended:

- 1) DO NOT DX A PBBS! In this case, DX means multi-hop digipeating to a PBBS on VHF.
- 2) Don't send the PBBS a command before it has responded to your previous command!

Hitting a key twice (or hitting it harder!) WILL NOT improve your chances of getting through! The nature of a packet system is that the message gets through accurately, or not at all. Sometimes it may take a while, especially if a digipeater or HF link is involved, but it will get through. If not, you will get a *** DISCONNECTED message.

Untimely POOP

POOP can't easily be made timely, but TNCs can! And TNC's that aren't timely can sure contribute to the level of POOP on a packet channel!

In the January, 1986 issue of PSR Quarterly, Tom Clark, W3IWI, made a convincing argument for the setting of the DWAIT parameter for all packet operations. His recommendations are:

User type	Time mSec	TNC 1 DWAIT	TNC 2 DWAIT
Digipeaters	0	0	0
Keyboard users	160	4	16
PBBS, Hosts	320	8	32
File Transfer	480	12	48

Digipeaters wind up with the highest priority. Since these stations are the most susceptible to collisions, and generate the most congestion on a retry, they deserve first shot at an empty time slot.

Keyboard users, operating in a keyboard-to-keyboard QSO, generate little traffic. After all, one can only type so fast! They get the next priority.

PBBS and host stations generally produce a fair amount of data out for a little data in. Thus, the keyboarder has priority getting into the PBBS, but the PBBS waits for other keyboard users before dumping what will probably be a longer packet onto the channel.

File transfers, generating the most data and hence requiring the most bandwidth, are requested to be more polite and give other users a fair shot at the shared channel. Thus, they are held off the longest.

Wide adoption of this scheme may not significantly reduce congestion on a channel, but it should help the channel operate on a fairer basis than otherwise.

Snake POOP

A snake has a fairly unique characteristic. A snake has no ears!

Too many packeteers seem to have the impression that, by connecting a TNC to the speaker jack on their radio, they don't have to have a speaker connected!

The results can often be observed. Excessive retries on a channel because the antenna isn't oriented properly, leading to multipath and poor reception. The other end of the link simply "goes away" for no apparent reason (unless you are listening!). The other station is over-deviating, or another user on another mode, or... And, on a shared-mode channel (or shared repeater), packet can get a bad name in a hurry!

Kangaroo POOP

A kangaroo jumps around. If you have long files to transfer, you should jump around, too!

A busy channel during the early evening hours is not the place for file transfers, automatic message forwarding or similar bandwidth-hungry procedures. What can you do? Jump off to another frequency, perhaps. If this is not feasible, set your alarm for 3 AM and jump to another time, eating up the channel then.

POOP - the final scoop

The ultimate means to eliminate POOP is to SCOOP! By means of the SCOOP, no one will ever be able to detect packet POOP emanating from your station!

SCOOP means Setting CORrect Operating Parameters. If you heed the advice to avoid POOP given above, this final measure will permit you to have a full clean-air rating!

- PRM -

THE FOLLOWING COMMENTS ARE FROM COMPUSERVE HAMNET AND SHOULD HELP TO KEEP THE 'POOP' ARTICLE IN PERSPECTIVE.

From: HANK GREEB N8XX 72277,706

To: Pete WB9FLW 76317,625 (X)

NOPPOOP.DOC, read with tongue in cheek, sure has a different flavor. However, some hams around here use it as the Gospel of good operating to tell me that:

1) I may NOT call CQ - at least not more than once per half hour.

2) I may NOT send a (CNTL) G even when I'm trying to wake up my buddy (because others MIGHT be eavesdropping and MIGHT be disturbed).

3) I MUST use vertical polarization even when I want to talk more than 150 miles.

4) I MAY NOT send a beacon to drum up business, 5) etc.

Some of these people aren't even dry behind the ears when it comes to having a ham ticket - though they are computer whizzes. Shucky durn, I've made mistakes at everything I try the first time, so why get upset. (I've worked PK-64 and NOCALL several times on the air, so I know that others also make mistakes.) I personally don't care if people send thousands of beacons, if they attempt to clear my screen (I've got the escape character filtered out) or send control G's at me (I could filter that one out too, if I so desired). I turn my monitor off, turn my desired calls list on (when I REALLY want privacy), and have selective calling/ answering at its finest!!! Glad the BBS system works so well.

73 de n8xx hg

From: David Toth VE3GYQ 72255,152

To: HANK GREEB N8XX 72277,706 (X)

Hank, the purpose of the Packet POOP article was to highlight some of the excesses of the established operators, from whom the novices pick up their habits ... once you are on packet for awhile, you will see how "RIGHT ON" that article is.

73, Dave

From: HANK GREEB N8XX 72277,706

To: David Toth VE3GYQ 72255,152 (X)

Tnx your msg. There are SOME around here who take the NO-POOP.DOC MUCH too seriously... And, besides, try to tell the novice packet operator that he's a lid the very first time he screws up. Shucks, when they do it to me I tell them where to get off - when they do it to a true NOVICE who is shakey on his Ham Radio feet he is likely to go away and think that the people in PACKET are unfriendly. It's my philosophy that a NOVICE can't be a lid - only those of us who know better, but don't really care, can be lids.

PRM -

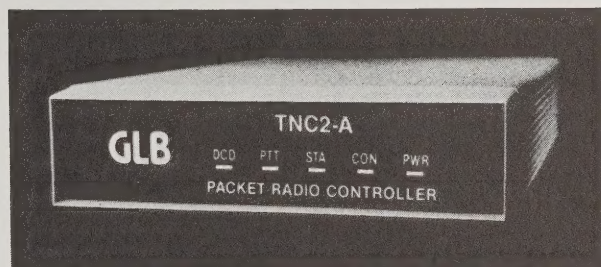
GLB TNC2A PACKET CONTROLLER

GLB Electronics - the first commercial producer of packet controllers joins the "TAPR Revolution" to bring you the GLB Model TNC2A Kit. This kit is the latest TAPR design and is supplied with top quality components. The GLB TNC2A is backed by over 14 years of experience in amateur radio kit products and our technical staff is available to assist you daily from 1 to 3 PM Eastern time.

GLB Model TNC-2A Kit

FEATURES

- AX.25 Version 2.0 Software
- Terminal baud rates - 300,1200, 2400, 4800, 9600
- Multiple connects - up to 10 stations
- Date/time stamping
- Standard DB25 for RS232 connection
- Simple radio hookup
- Radio modem w/built-in counter for calibration
- Low power CMOS option
- Tuning indicator socket for HF & satellite work
- Modem disconnect for future options
- Lithium battery backup for RAM



Hardware
Software
Documentation

by TAPR

SPECIFICATIONS

- CPU** - Z80A microprocessor
Clock - 2.4576 Mhz standard, 4.9152 Mhz available
Memory - 32K EPROM, 16K RAM standard
HDLC - Packets are controlled by hardware for maximum performance permitting full duplex operation
Modem - 1200 baud, Bell 202 compatible (standard) easily configured for 300 baud/200 Hz shift for HF use
Serial - Computer/Terminal port is industry standard RS-232-C compatible for use with most equipment
Radio - Watchdog timer for channel protection transmits audio levels adjustable for nearly any radio. Wide dynamic range demodulator. Channel busy input (RF-DCD) to inhibit packet transmissions on a shared channel.
LEDs - Power - tells you when power is applied
 Status - tells you when you have unacknowledged traffic in your buffers
 Connect - tells you when you are in the error-free mode
 DCD - tells you when your TNC2A senses other activity on the channel
 PTT - tells you when your TNC2A keys the transmitter
Power - +10 to +15 VDC CMOS-110 ma NMOS-260 ma Typical

Model TNC2A Kit NMOS	\$154.95
Model TNC2A Kit CMOS	\$169.95

Quantity discount schedule:

1-2 pcs -	net
3-4 pcs -	7%
5-9 pcs -	10%
10-19 pcs -	15%
20 & up -	20%

Shipping weight - 5 lbs.

GLB ELECTRONICS, INC.

151 Commerce Pkwy.,
Buffalo, NY 14224
716-675-6740 9 to 4

TOO GOOD TO BE TRUE?

PAKRATT™ Model PK-64

shown with enhanced
HFM-64 option installed



★ MORSE ★ BAUDOT ★ ASCII ★ AMTOR ★ PACKET ★

FIRST FIVE MODE DATA CONTROLLER

The Pakratt model PK-64 by AEA is the world's first computer interface that offers Morse, Baudot, ASCII, AMTOR and Packet all in one box (hardware and software included) at a price many competitors charge for Packet alone (from \$219.95 Amateur net). Do not let the low price fool you; coming from any other company but AEA it WOULD be too good to be true. The PK-64 works with virtually any voice transceiver. The Pakratt is the easiest of any to hook up and have operating in just a few minutes.

In Packet mode, the PK-64 offers virtually all the features of every other Packet controller on the market, plus many important features left out by others due to cost constraints. For example, we have included a hardware HDLC, true Data Carrier Detect (DCD), multiple connect with up to ten stations simultaneously and full implementation of version 2.0 of the AX.25 protocol.

Because the PK-64 was designed specifically for the Commodore 64 (or C-128 and SX-64) computer, we have been able to do many things not economically feasible with general RS-232 interface controllers. For ex-

ample, the Pakratt includes true split screen operation with on-screen status indicators and an on-screen tuning indicator.

ENHANCED HFM-64 MODEM OPTION

The standard PK-64 will operate all modes with a phase-lock-loop (PLL) detector roughly equivalent to all popular packet modems in the marketplace (except we have included extra filtering). The enhanced HFM-64 modem option offers true independent dual channel filtering with A.M. detection (like the famous CP-100 Computer Patch™). The enhanced HFM-64 option also offers a hardware LED tuning indicator (like the CP-100) and a front panel variable threshold control for setting maximum sensitivity under various band conditions. We recommend the HFM-64 option for anyone keenly interested in weak-signal heavy-QRM HF operation. For anyone desiring to operate FM RTTY with the standard North American tone pair or CW receive, the HFM-64 is required. The HFM-64 is field installable with no soldering or test equipment required.

WORKS WITH THE POPULAR C-64 COMPUTER

AEA designed the PK-64 around the

low-cost C-64 because of the special architecture features making it especially suited to Amateur Radio applications. The C-64 should not be viewed as a mainframe, but rather a very economical accessory to your data communications system. Many owners of expensive computers such as IBM, TANDY, APPLE, KAYPRO, ATARI, etc., are now buying the low cost C-64 and dedicating it to their operating position. They simply cannot find software for their machine that even approaches the power and user friendliness of the PK-64. Plus, think of the convenience of having only one controller and keyboard to go from one mode to another without having to re-do cabling!

The PK-64 is so complete that all you need to do is wire up a microphone connector to the end of a cable (provided) and you are ready to go. There is no need to track down special terminal software, cabling or even a power supply. It all comes with the PK-64. So do not be the last on your block to own the most exciting new product in years. See the PK-64 at your favorite dealer or write for our specification sheet now.

*Prices And Specifications Subject To
Change Without Notice Or Obligation*

Advanced Electronic Applications, Inc.
P.O. Box C-2160, Lynnwood, WA 98036-0918
(206) 775-7373 Telex 6972496 AEA INTL UW

AEA Brings you the
Breakthrough!